SCIENCE AND INDUSTRY

ORGANIC GARDENING

MAR 5 1943
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FEB. 1943

A RODALE PRESS Magazine

25c

The Healthy Soil

By Dr. J. Amon-Wilkins

THE NATURIST RESORT
Isle of Pines, Cuba.

"LOOK at the worms! Look at the worms! was our happy exclamation. We were transplanting papayas last rainy season just after a delightful rain, as we spaded up the soil we observed the worms crawling in every direction. Of course we were all aflutter at seeing them, yet a few visitors standing around couldn't understand the reason for our excitement over worms. They had seen worms before, possibly they had used them as bait for fish, however, we were excited over this discovery. To us it was like finding gold, in fact, more valuable than gold, because with gold you can buy food and you may be able to buy worms too but that is as far as you will get. The food you buy with your gold may look like any other food to nourish the body, but chemically speaking, you may eat such food and yet become sick from chemical starvation. Your gold can't make those teeming worms produce a healthy soil overnight.

We had a right to be pleasantly excited, for there was a time when this same soil in which we were transplanting our papaya plants did not have any worms, and although pine trees and scruff grass grew from it, it was unable to nurture fruit trees that would produce nutritive and delectable fruits.

This was five years ago when we started our tropical subsistence naturist colony here. Up to that time the land had been used for the pasturing of cattle, and the cattle tenders would burn the land every year to clear it rapidly, so that when the rains came new green blades of grass would sprout from the old roots. The cattle like this young grass. No thought was given to the fact regarding the terrible top-soil destruction from burning that was created and perpetuated year after year by ignorant and thoughtless cattlemen. Their aim was to merely have pasture for their cattle. Of course, in the rainy season the grass would grow rapidly, and too, the cattle can ramble through the wild mango and guava groves, and along the brooks to feed and make up the chemical deficiency created by eating grass grown in unhealthy soil.

We tried to grow vegetables and fruit trees in this soil, but it was a hard job, which was soon made practicable by rehabilitation of the soil. The process of which makes our story valuable, and which process has now established a healthful condition of the soil so that earthworms can live and further enrich the soil so that nutritious foods can be produced to sustain us and make us healthy.

With hundreds of acres of pine forest and land cleared for pasturing of cattle and goats, there are numerous brooks transversing the thousand acres of our land. Along these brooks are dense thickets of wild trees. Thousands of them are roseapples, wild berries, plums, etc. Also there are several big mango groves, with trees over a hundred years old.

(Continued on inside back cover)

BACK TO NATURE

Notes and Dont's

Compost Heaps

DON'T forget your compost heap. If you haven't got one—start preparing to build one immediately. Remember, compost takes the place of fertilizer and, weather permitting, can be made within a short three months. All sorts of organic waste — leaves, straw, grass, kitchen refuse—may be used. Gather this waste into a convenient pile and when warmer weather arrives, complete your compost pile. Of course, a compost pile started in early spring will probably miss the first plantings but for the vegetables that are to be put in later on, you will find that your homemade compost fertilizer will make them grow with surprising speed and will put into their juice a delicious flavor that cannot be duplicated by the use of high-priced chemical fertilizers.

• • •

Trenching

When the days begin to warm up — and occasional thaws set in—give a thought to the fertilization of your garden along the lines of burying your kitchen waste in trenches as suggested in last month's issue. This is a sure, steady, easy method of continuous fertility without the purchase of five cents worth of chemicals or other fertilizers. This trenching-kitchen waste method also solves the problem of kitchen waste disposal. But above all, it assures you of good crops—continuous good crops—in the years to come.

• • •

Hillside Gardens

Plan your garden — now. Figure out how the sun, swinging to the north in the summer, will shade the ground. Again, no matter what its shape — commonsense should tell you to run the rows north and south in order that the sunshine, traveling from east to west, will strike both sides of each row sometime during the day. The only exception to this rule is where your garden *must* be made on a hillside and north and south rows would run up and down the hill. Such rows prove very disastrous—they cause rapid erosion of your precious top soil during the spring and summer rains and have a tendency to dry out your garden. If your garden *must* be laid out on a hillside, go to the trouble of terracing the hill, making each step level. This prevents erosion and tends to hold the precious moisture.

• • •

Digging Your Garden

When you are turning over the soil in your garden this coming spring, do not do it too vigorously. Do not dig too deep and bring up clay and other tightly packed earth that will form a crust over your top loam and prevent the moisture from seeping in. Many a garden has been ruined merely by putting the good loam far down in the earth for the roots of the plants to use and covering the top with a type of earth that sheds water almost as effectively as concrete.

• • •

Bushes

In setting out permanent bushes in your garden, place them all in rows at the north end. Thus when they develop, their shade will not interfere with the rest of your plants. Current bushes should be 4 feet apart with gooseberries and raspberries about the same or a little less. Loganberries and blackberries should be planted against a fence or a screen and should be 8 or 10 feet apart.

ORGANIC GARDENING

EMMAUS, PA.

Vol. 2, No. 3, Feb., 1943 | $2.00 a year | 25c a copy

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With the Editor

Bugs, Worms, Blights and Rusts

A NUMBER of years ago I heard the statement that on a farm in New York State they were actually demonstrating that well-nourished vegetables were distasteful to insect pests. At the time that idea seemed illogical—so illogical that I would have wagered that the greener, the more leafy, the more luxuriant a plant, the more enticing it would appear to bugs, caterpillars, blights and rusts.

However, today my opinions have changed. On our experimental farm here in Eastern Pennsylvania we have seen some things happen that have altered my point of view. Now, please do not misunderstand me—we have proved nothing *conclusively*. In our limited time—we have made no sensational discoveries—we have merely been groping our way along, using whatever reliable information we could obtain and putting into actual practice our convictions that organic fertilization is a far more natural method for raising crops than doping the soil with high-powered, concentrated chemicals.

It will take several years before the experiments on our farm will be in any manner conclusive as we started with a soil that for many years previous had been pretty well worked out and which, from time to time, had received an average amount of chemical fertilizers.

We had to start from "scratch" and not only refertilize the soil but also to counteract the effect of whatever chemicals—from previous dopings—still remained in that soil to plague us. Yet, even today—after those two short years—we are able to release some data that speaks for itself. Two years ago, we put in 20 acres of corn. The resulting yield was about average for this part of the country—nothing startling. But it gave us a sort of yardstick by which to measure. Now, this last spring, we planted only 13 acres of corn, but we planted it on soil which had received a partial dressing of compost. The results this fall showed two things; first, the yield of corn from that 13 acres of composted soil equalled the yield of the 20 acres of uncomposted soil of but two years ago. Second, the corn

Rodale Press. Executive and Editorial offices, 6th and Minor Sts., Emmaus, Penna. Subscription rates 12 issues for $2.00 **ORGANIC GARDENING**, published monthly by Rodale Press, at 6th and Minor Sts., Emmaus, Penna. Application pending for entry as second class mail at the postoffice at Emmaus, Penna., under the act of March 3, 1879.

raised this last year was far superior in appearance, in health and in length of the ears to the corn raised the first year. Not only that, but this last crop of corn from those 13 composted acres seemed—now, please note the word *seemed*—much freer of rusts, blights and insect pests than did the corn raised on the same land, without compost, only two years ago.

Now, in addition to our own experience we have seen much additional evidence piling up along these lines.

This evidence does not come from one segregated community—it does not come from the experiments of some isolated scientist—it does not come from the inconclusive findings of a testtube. It comes from all parts of this world—from gardeners and farmers of many nationalities working under all manner of climatic conditions and tilling every imaginable type of soil.

Frankly, it was the writings of Sir Albert Howard that started me investigating this seeming phenomenon of proper plant fertilization. The wonderful results that he had achieved in India, fighting insect pests and plant diseases merely through proper fertilization of the soil, astounded me. It was all so contrary to my logical deductions that I was intrigued and fascinated. I determined to go deeper into the subject and the more I talked with true soil bio-chemists the more I learned about many strange antics of nature—things that were not blazoned in the text books nor even referred to in most of the agricultural literature I was able to find.

For example, Dr. G. H. Earp-Thomas, the noted bacteriologist, in answer to my question regarding the immunity of well-nourished plants from insect pests replied: "It is a most difficult situation to explain. I have found, however, that many fruits—the apple for example—when grown with organic fertilizer, does have a tangible protective something that the poorly nourished apple lacks. This protective something is a wax-like covering over the skin. Now, the better the apple is fertilized, the deeper or thicker is this wax-like covering. The poorer the fertilization, the thinner is the wax. In cases of very poor fertilization, this wax protection may be so thin as to be almost indiscernible. Please remember that I am not claiming that the presence of this wax does keep insects away but—coincident or not—I have always found that where this wax covering is well developed—no insects or rusts or blights seem to bother the fruit in question."

From another source comes supporting data, but from a different angle. This source, a great student of natural living and a dietician of national repute, added his conclusions as follows: "A number of years ago, most physicians would have given it as their absolute opinion that a person's physical condition had little or nothing to do with their resistance to an infectious disease. Today, these physicians know better—and most of them believe that a well-nourished person, with the full allotment of minerals and vitamins, is mighty near immune as far as disease, ailments or other ordinary disorders are concerned. In the same way, the plant is affected. Remember, plants and human beings live on the same things—both plants and animals require air, sunlight and the same type of organic minerals. Neither of them can use inorganic minerals in the raw state for nourishment. These inorganic minerals—for both plants and human beings—must be changed into live or organic minerals before they are capable of being utilized as nourishment. Isn't it logical then, that if a human being will not catch a disease or suffer an ailment if the body is properly nourished, that plants, feeding on the same materials, will not be subject to disease—such as blights and rusts—if such plants are properly nourished?"

The whole proposition seems to come down to a proper proportion of minerals in the food of man, animals and plants. We know that plenty of lime in the soil—brought

to human beings through the food grown on that soil—has not only banished tooth decay from all the inhabitants of Deaf Smith County in the State of Texas but has knocked out the old time-worn idea that pyorrhea, gingivitis, and other mouth troubles come only from infection.

From Missouri, we have the statement of Dr. William A. Albrecht, Chairman, Department of Soils, Missouri College of Agriculture, that from his own personal observations he found that cattle—left to their own devices, would turn down good appearing food in nearby acres and would travel a long distance to eat the crops on plots that were most abundant in minerals — particularly lime.

The evidence is piling up—piling up rapidly. It is not for us here to draw definite conclusions at this time. As we stated in the beginning, everything with us is strictly in an experimental stage. We attempt to jump to no conclusions—nor do we seek to force our convictions upon anyone. However, we are absolutely convinced that the proposition of nutrition of plants and the incursions of bugs and ailments constitute allied subjects—in some manner interdependent—t h a t are well worth close study and consideration. Whether the bug, the rust and the blight are kept down by the well-developed wax-like covering of the well-nourished fruit and vegetable or whether the presence of all the needed minerals and vitamins in such well-nourished plant makes it too aromatic or too concentrated in flavor or too tough for the bugs, we do not know.

But in due time, we expect to have the right answer—not today, not tomorrow. In fact, not necessarily this year, but eventually—yes, we will know the truth.

Altogether this proposition of fighting insect pests and plant ailments through proper nutrition is a big, big subject. But it is a mighty interesting one. It is our hope that you—the reader of this publication—will not hesitate to comment on your own findings in this particular branch of agriculture and also to supply us with any information you may have gathered—from actual experience—in eradicating bugs and plant ailments from your garden through use of proper fertilizer alone. Poison sprays are out!

J. I. Rodale

Vitamins—and Colds

Experiments made at the University of Minnesota have proved conclusively that the taking of vitamin pills will not reduce the number of colds nor will they reduce the duration or severity of such colds. These experiments, conducted with several hundred students acting as guinea-pigs over two successive winters, show conclusively that vitamins alone—A, B_1, B_2, C and D—will not save you from your regular allotment of sneezes and sniffles.

In marked contrast with these high vitamin dosages, administered by the three physicians out at the University of Minnesota, is the concise report of Sir Albert Howard about experiments made in England. There certain school children were fed on natural produce, grown with organic fertilizer, and this food alone reduced the number of colds, almost banishing them entirely as well as practically eliminating many other ordinarily serious ailments. The vitamin pill rage must run its course—it is an established fad in this country at the present time—but the foundation of all health as far as the family is concerned, including the elimination of colds, is the backyard garden fertilized with ordinary, home-made compost fertilizer. Poor nutrition is responsible for the vast majority of human ailments so it is just o r d i n a r y common-sense to make a good garden this year and allow it to take the place of your medicine chest in the bath room.

Fragmentation

By "fragmentation" is meant the lack of co-ordination between various investigators; where each one gets a mere fragment of the whole subject without, possibly considering its effect on the whole.

By Sir Albert Howard, C.I.E.

From THE CROSS AND THE PLOUGH
Published by the Catholic Land Federation of England and Wales

THOUGHTFUL people are beginning to realize that one of the great difficulties which will have to be overcome before the activities of the Ministries of Agriculture, Food and Health, for example, can be co-ordinated is the present splitting up of the subject. A school of thought has arisen and is rapidly gaining ground based on the principle that a fertile soil means healthy crops, healthy livestock, and last, but not least, healthy human beings, the logical outcome of which is the amalgamation of the three ministries which handle food — Agriculture, Food and Health—into a single agency. As the subject of nutrition becomes broken up into bits, two new problems are created: (1) powerful vested interests, like the milling and artificial manure industries, which now hamper progress are able to dig themselves in more and more effectively and to strengthen their stranglehold, because their operations escape attention when the nation's food supply is handled by three independent ministries; (2) the blunders of the administrators also increase. One glaring example has just been brought to my notice in which the Ministry of Food has nipped in the bud a most important development in social service which is vital to the health, efficiency and contentment of our labor force—a factor on which the results of the war might ultimately depend. Readers of this journal may like to know the details.

At the Winsford Bacon Factory in Cheshire, one of the most efficient organizations in the kingdom, the Co-operative Wholesale Society some time ago decided to try out the principles underlying *The Medical Testament* of the Cheshire doctors and to provide the staff, some 150 in number, with two good meals a day at cost price, the fresh food used being raised on fertile soil. For this purpose an area of land round the factory was brought into a high condition of fertility by the help of humus made from the wastes of the factory and of the land. Things were going well, the manager was enthusiastically devoting to this work his great powers of organization and initiative, the local doctors, as well as the local notables, were watching the developments with interest and sympathy. I sampled one of these meals, which could not be bettered

anywhere. At Winsford I felt a fire was being lighted which would soon spread throughout the length and breadth of the land for the reason that enlightened industry has for some time been trying to find some means by which cordial working arrangements can be established between the management on one side and the labor force on the other. One direction is obviously for capital to use its powers to improve the health, well-being and contentment of the workers. Winsford was providing such an example of constructive social service. Then the blow fell. The Ministry of Food decided to close this factory under the scheme for the concentration of industry, quite oblivious of the fact that important developments were in progress in the processing of pigs, in the preparation of various animal extracts needed in medicine, as well as the provision of ideal meals for the workers already described. Naturally protests were raised. The Society's appeals to the Tribunal and to the Ministry of Food were disallowed. The Cheshire Panel Doctors also took up the case and laid the facts before Lord Woolton. In the correspondence which followed the Ministry cut a very sorry figure and were literally reduced to mincemeat. Had it been possible to take this case to the High Court, His Majesty's Judges would have castigated the bureaucrats in no uncertain fashion. The decision to close the factory was obviously made without a knowledge of the facts—in other words, on a fragment only of the case.

In the field of agricultural research the evils of fragmentation reach perhaps their highest development. I will quote two recent examples which have come to my personal notice.

The first concerns the Rothamsted Experiments on the continuous growth of cereals with the help of artificial manures. In a recent issue of this journal Mr. H. R. Broadbent has dealt with the weaknesses of one of these trials—those with wheat on the Broadbalk field. I shall refer to another on the greensand at the Woburn branch of Rothamsted. In the nineteen thirties the soil on these continuous experiments was beginning to go on strike as a result of repeated doses of chemicals, and the Board of Governors began to be alarmed. About 1936 I was invited by the Vice-Chairman of the Governing Body, the late Professor H. E. Armstrong, F.R.S., to accompany him to Woburn and see the condition of affairs with a view to the discovery of the cause of the trouble.

I have a vivid recollection of this visit. After listening to a learned discussion on the history of these plots by the officer in charge, we set out to see the crops, the Professor suggesting that we might take a spade with us. We saw the plots, to which a complete artificial dressing had been applied for many years. There was, however, no crop to see, only a copious development of the common mare's tail, which I believe was *Equisetum arvense*. I then enquired if any really good crops on similar land were to be seen and, if so, what was the manurial treatment. We were shown a fine crop of lucerne (a deep rooting perennial) which had been raised with pig manure. The cause of the failure of artificials on the cereals and the remedy were at once obvious. The natural aeration of the soil had been destroyed, as was indicated by the weed flora. I told the officer in charge that he would find a pan from six to nine inches below the surface of the ruined plots and that this had been caused by the destruction of the crumb structure, resulting from the stimulating effect of the artificials on the soil organisms, which naturally used up all the humus, including the humic cement of the compound particles, and that this diagnosis would be confirmed by a study of the root development of the *Equisetum* weed. This proved to be the case and the Rothamsted officials then came in contact, I believe for the first time, with the pan formation so common in sandy soils. This always interferes with soil aeration and upsets the normal life of the soil. At Woburn artificials had obvi-

ously changed the soil flora and prepared the conditions needed by a weed of semi-swampy land. My diagnosis was a simple application of the principle of reading one's practice in the plant.

The second example concerns the eelworm disease of potatoes which is now appearing all over the country as a result, I believe, of the continuous application of artificials. A few years ago I studied an interesting example on the lighter potato soils south of the Wash. Here the loss of the crumb structure following the destruction of the humic cement of the compound particles had given rise to the red and blue markings characteristic of heavy clay soils and a weed flora typical of wet swampy soil. Under the conditions of poor soil aeration so established, the eelworm disease of potatoes flourished and destroyed all prospects of a crop.

The methods by which conventional agricultural science was dealing with these two problems was interesting. At Woburn a rigid statistical enquiry into the yields was mainly relied on to discover the cause of the land going on strike; south of the Wash an expert on eelworms was commissioned to discover, if possible, some means of overcoming the parasite. In neither case did it occur to the specialists that when troubles like these occur, Nature invariably sends us a messenger to say that all is not well with the soil. The only effective reply to such missives is to restore the soil conditions, and not to slay the bearers of evil tidings, as is now the rule. Naturally the results have never been impressive.

These two cases are typical of hundreds of examples to be seen all over the world of the misapplication of science to the vast biological complex we call agriculture and in which one factor is always influencing another. Not only are these factors in any particular season members one of another, but their incidence is dependent on what has gone before. In investigating such a system, how can the specialist, who has spent his life in learning more and more about less and less, or the statistician, whose data must always be in strict relation to the subject investigated, hope to succeed? Why not follow the methods Charles Darwin used in his studies of the earthworm and put simple questions to Nature and then build up a case on her replies?

I think I have said enough to establish the thesis that in the steering of the Ship of State, in the administration of our day-to-day affairs and in the investigation of our problems by means of science, we need an entirely new outlook. Knowledge must be the handmaid of understanding. There must also be a happy combination of the mental and the spiritual. One of the duties of our schools and our universities is to provide a stream of men and women capable of these tasks.

Mulching Compost Heaps

Experience has proved that a small compost heap is as effective as a large one but the one drawback of the small heap is its tendency to dry out —to lose its moisture—and thus prevent the bacteria from getting in their beneficial work. To obviate this trouble, it has been suggested that the small compost heap be covered with a mulch of hay or straw—this mulch being placed on top of the covering of five or six inches of earth that usually encases the compost heap. In other words, when the final covering of earth is in place, bury your compost heap with a mulch—about a foot thick—of straw, or hay. This mulch will help hold the moisture in the heap and will prevent excessive drying out from the rays of the sun. Dampen down this mulch so that it will not blow away, and keep it dampened. This mulch idea seems to solve the final problem for the small gardener who believes in compost making, but who has found from experience, that the small heaps dry out too fast to be wholly effective.

Hints for the Victory Gardener

TOMATOES

This is the third of a series of articles by this author dealing with the cultivation of ordinary vegetables.

By Roger W. Smith

ONE of the richest sources of the Vitamins A, B, and C, is the common tomato so easily grown in almost every back yard. Because of its food value and ease of culture it ranks amongst the most impotrant plants available to the Victory gardener.

The origin of the tomato is obscure. We know that its name came to us from the Mexican word "Tomatl," but until a comparatively recent date the tomato was grown as an ornamental known by such name as the "Cancer Apple." In olden times it was believed to be poisonous and disease producing. Nowadays, however, we understand its great food value and appreciate its importance.

If you decide to grow your own tomato plants you will find the reward well worth the extra work. One ounce of seed will produce about two thousand plants. If you buy a couple of generous packages of good quality seed, you should be able to produce about three hundred plants.

In February or March in a sunny, southern window, arrange some sort of window box. Almost any small, wooden box filled with fine, loose soil and having reasonable drainage will serve as a seed bed. Tomato seed germinates best at about 70 degrees Fahrenheit — approximately house temperature. The seed should be evenly spaced and not planted deeper than one half inch.

The young plants should appear in from eight to ten days and for the next two weeks they should be watered from the bottom. The surface of the soil in the seed bed should remain as dry and sunny as possible to reduce the danger of damping off, a condition fatal to seedlings and brought about by the growth of soil born organisms flourishing because of excess moisture.

To water from the bottom, place the box containing the seedlings in a pan containing shallow water and allow it to remain there until the soil has absorbed the moisture it requires.

As soon as the seedlings form one or two true leaves in addition to their seed-leaves they should be transplanted. The tray into which they are transplanted should be capable of holding individual containers about three inches deep. These individual containers may be berry boxes, paper cups with the bottoms removed, paper boxes, small flower pots, cans with holes in the bottom, etc. Each plant should be moved to its own container and the containers packed in the tray with soil to prevent too rapid drying out.

The idea being to give each seedling about three inches space each way and to keep

them growing rapidly. When the time comes for moving the young plants into the garden (about seven weeks from the time the seed was sown) this can be done in such a way as to cause the least possible disturbance to the roots and the soil surrounding them.

The tray containing the young plants should be kept at a rather low temperature in a cold frame or unheated room in order that the seedlings may become stocky rather than spindly.

While the young plants are developing, the good gardener gets busy preparing a place for them in his garden.

Although tomato plants will bear fruit in from 48 to 86 days after they are planted in the garden, they are essentially a warm weather plant. They require an open, sunny, well-drained location.

The soil should be porous, fairly light, and contain a fair amount of humus. If the soil in your garden is quite heavy, that is, containing a large percentage of clay, you will find that you can improve its texture by the addition of sifted coal ashes. But for plant food it is necessary to apply a generous quantity of humus from a well made compost heap.

The addition of composted material will also bring very sandy soil to a satisfactory condition.

Avoid choosing a poorly drained spot. Any part of the garden where rainwater tends to form a pond is a very poor place for tomatoes. Many diseases of tomatoes are associated with poor drainage, including bacterial wilt, stunting, and fruit rots.

You will find also that air drainage is quite important. Tomatoes thrive in open locations where the free movement of the air is not hampered by the surroundings. Most leaf-blighting fungus diseases and fruit decay are prevalent in locations where poor air drainage exists.

So if you keep in mind the fact that the tomato likes well drained, porous soil, plenty of well composted humus, plenty of sunshine, and plenty of air, there is no reason why you should not grow tomatoes that will be the envy of your neighbors.

Perhaps the most desirable method of growing tomatoes for the Victory gardener is the pruned, stake method. More plants can occupy a given space by this method and the difficulties of cultivation are greatly reduced.

After all danger of frost is past, set the tomato plants deeply and about two feet apart each way. Drive a five-foot long stake into the ground alongside each plant. Tie the plant to the stake with soft yarn or small strips of old cotton clothing. It is best to make the tie tight around the stake and loop it loosely around the stem of the plant just beneath a leaf node. This prevents injury to the rapidly growing stem.

If paper containers have been used the plants can be set in the prepared place without removing the containers. The less shock the plant has to endure, the more quickly it will continue its rapid growth.

However, you will find that the plants will overcome the shock of transplanting more quickly if supplied with a good starter solution. This is easily made. Mix two parts of water with one part of sifted compost humus. Allow the mixture to settle. Apply this solution to the hole in which the plant is to be set and again after the plant has been firmed and settled in place.

Because of the necessity of hurrying the growth of the young plants they are set out as early as possible so that it is sometimes necessary to give them protection against the damage of late frost. This is easily done by using inverted baskets or paper bags over the plants during unusually cold nights.

Using the pruned, stake method, it is necessary to pinch out the side shoots so as to produce two main shoots which are tied to the stake. If you follow this method you will have larger tomatoes and will have no trouble keeping them off the ground.

But many Victory gardeners, because of lack of time, find it necessary to allow their plants to grow without staking or training. If you do this your total crop will likely be

about the same although the individual fruits will be smaller.

It is best, if you decide to use this method, to set the plants about four feet apart each way. And before the many sprawling branches bend down to the ground, spread a layer of clean straw, dried grass or similar material around each plant to keep the fruits from coming into direct contact with the ground.

Out of so vast a variety of tomatoes from which to choose, to which should the Victory gardener give preference? When he selects his two packages of seed, which two varieties will give him the best results? What should be his first aim?

Generally speaking it is best to use only wilt-free, certified varieties as Break O'Day, Pritchard Marvel, Marglobe, and many others. In this way you eliminate one of your chief enemies, tomato wilt.

From disease-free stock there is indeed enough from which to choose—the giant Oxheart (each fruit often weighing around two pounds) the tiny Cherry tomatoes, the great White tomatoes (practically acid free)—the bright yellow Tangerine and Yellow Pear (excellent for salads and marmalades). The many varieties of tomatoes form an unexcelled galaxy of colorful fruit forms.

Generally speaking, early strains are more satisfactory for the Victory gardener than the late kinds. But if the summer is long in your locality you might use the late varieties to advantage.

The late varieties can be grown from seed planted in a cold frame and then transplanted directly to the garden, instead of using the seedbed-container-garden routine.

In some localities it is practicable to plant the seed directly into drills in the garden. The seedlings are then thinned until they stand the necessary distance apart. The advantages claimed by the adherents of this method are that the plants are much stronger because they root naturally in the place in which they are to grow, that the work of transplanting is avoided, that the plants undergo no shock and its following set-back caused by transplanting.

The disadvantages of this method seem to be that the seedlings, being very tiny are difficult to weed and cultivate and are a particularly easy prey to insects and disease and extremes of weather. This method is also extremely wasteful of seed.

During the summer the vines should provide a steady supply of fresh fruit for the family use. Later, when the crop reaches its peak, you will find it best to preserve much of it for future use. Tomatoes and tomato juice can be preserved in a number of ways. Whichever way you choose, you may be confident that the material will be a valuable addition to your family diet.

After most of the tomatoes have been gathered, but before the first killing frost, you will find a large number of green and still growing tomatoes on the vines. This not inconsiderable crop should be gathered and sorted. The smaller green tomatoes may be used for the making of relishes, etc.

The larger green tomatoes may be wrapped individually in newspaper and placed about three layers deep in open crates or boxes. These crates of wrapped tomatoes may be stored in any warm place and will ripen without the aid of light.

Perhaps, as the vines grow and their fruits hang heavily on them, you will notice several plants which produce fruit that especially appeals to you—some striking difference, better flavor, thicker flesh, finer color, larger vine—you find some quality you admire. You wonder about the possibility of saving seed from these special plants for use next year. This is easily done.

But before you begin you will find it best to consider the individual plant as a unit rather than the individual fruit. The seed of an occasional large fruit found upon a vine which produces only inferior fruit will, as a rule, produce plants bearing fruit equal only to the inferior fruit. But if the vines you se-

lect show vigorous growth, good leaf color, and heavy sets of uniform fruit, then the chances are that the seed will produce plants having these superior qualities.

You will find it convenient to mark any plant selected for seed. Tomatoes are self fertile and do not cross to any great extent, so you will not have to worry much about the distance of the selected plant from some inferior one.

The tomatoes selected for seed should be allowed to remain on the vine beyond the edible stage but not so long that decay has set in.

If only a few seeds are to be collected it is a simple matter to halve the fruits, remove the seeds with the thumb, then wash and dry them.

For large quantities the fruit is picked, placed in a wood or earthenware vessel and mashed. Water is added in a quantity equal to the mash and stirred vigorously. The resulting pulp should be held at about 70 degrees Fahrenheit and allowed to ferment for three or four days, being stirred now and then.

This fermentation will cause the good, heavy seed to settle to the bottom where it will remain while the pulp, inferior seed, and water, are poured off. This fermentation is also Nature's method of eliminating many seed-born bacterial diseases.

The heavy seed should then be washed in clean water and spread out thinly on paper. It should be kept out of direct sunlight but in a place where it will dry rapidly. When dry, the seed should be stored in envelopes or paper bags in a cool, dry place.

Perhaps, during the long winter months, you remember the specially selected seed you have stored. You shake the envelopes which each contain no more than a pinch of tiny, scale-like seeds weighing almost nothing.

Another summer comes along. the tomato seed you saved proves almost 98% fertile and disease free. The seedlins flourish. And as you watch another crop of tomatoes coming on, you notice that every vine, almost every fruit, bears a close resemblance to the ones you chose last year.

Almost every fruit has that peculiar quality which you yourself selected. You realize that you have developed your own particular strain, one specially suitable to you and your locality. You wonder if the type of tomato you have developed should be given a name. You have learned to grow tomatoes.

Poultry Manure As Fertilizer

The United States Government estimated that last year's poultry population produced 22 million tons of poultry manure. This assures an ample supply of poultry manure for most localities. Yet many gardeners have found, from sad experience, that raw poultry manure did not work out satisfactorily when applied to their particular soil. This was because poultry manure is a very concentrated product and will kill plants if spread too heavily. However, poultry manure can be used with perfect safety if it is combined with organic matter in the ordinary compost heap. When it is used in this manner it should receive a generous sprinkling of wood ashes or lime to counteract excess acid tendencies. Poultry manure makes an ideal plant food as it is immensely rich in organic nitrogen. There is little difference between poultry manure and the usual guano of commerce —the guano being composed of the droppings of seabirds. A few years ago, no commercial fertilizer would have dared make a bid for public approval unless it was clearly shown that guano formed its foundation—but that was before the chemical industry took a hand in the situation. At the present time, the use of guano has practically been abandoned.

Your Kitchen Garden

Digging versus Pests

By Eleanour Sinclair Rohde

Reprinted from HEALTH FOR ALL (England)

IN spring and summer every gardening paper is full of advertisements of insecticides, etc., but *now* is the *real* time to deal with pests of all sorts. All the harmful insects hate disturbance, and the more you disturb the soil by digging, etc., the less you will be troubled with them next season. When hoeing in summer no one can fail to notice that certain insects when turned up r u n vigorously while others remain torpid. It is a safe rule, with few exceptions, that insects that run about when disturbed are y o u r friends, destroying real pests, whereas the lazy ones, such as the leatherjacket, remain curled up waiting for their food and only moving on from root to nice young lettuces, for instance, when it is necessary.

In winter deep digging exposes thousands of pests invisible to the human eye, but the sharp eyes of the birds (easily the best under-gardeners) quickly detect them and so they crowd to your help. Therefore, whenever the soil is in a suitable state, dig every yard of it that is empty. Heavy soil is usually in too sticky a condition at this season, and so all digging has to be done as early in autumn as possible, but light soils can be dug the year round. *If you are on a clay subsoil, never bring unfertile clay to the surface.* The more you cultivate your soil, the deeper you will be able to dig each season. I have a piece of ground which was formerly the kitchen garden of a large house, and, three feet down, the soil testifies to the excellent work of the Victorian gardeners who worked it. Unlike the soil beyond, it is a rich crumbly loam of a sort to make a French market gardener's mouth water, and on it you can grow almost anything. It takes years to bring soil to this condition, but it is worth it. You can overdo sun bathing, etc., for the human body, but you cannot overdo exposing every particle of the soil to the unlimited beneficent effect of sun and air. As I have before emphasized, the finest gardening injunction ever written is to be found in the book of Genesis, when Adam was told to till the ground and to dress it. Humans cannot "g r o w" anything, for though we all talk about growing plants, all we can do is to prepare the soil, and the more attention we g i v e to "tilling the ground," the finer the crops. No human being could literally "grow" a blade of grass.

Many a m a t e u r s regard spring as the beginning of the gardening year, but that is the middle of the season, and far too late to do any of the real foundation work. Now is the time to begin, bearing in mind that every half-hour devoted to digging, trenching, etc., means better crops and more and more freedom from pests. And what a joy digging it! It is the finest exercise in the world, affecting not only the body but the mind. And I notice that those of us who are

keen gardeners never seem to want any artificial amusement whatever.

Don't forget to give winter attention to the compost heaps. Turn them over in mid-winter, for this turning (and the more it is done the better) adds incalculably to the value of the compost. I am amazed, as I fancy most gardeners are, at the waste of first-rate potential manure in dust-bins. Every scrap of kitchen refuse in the shape of vegetable matter should go on to the compost heap, also carpet sweepings (this is shoddy in its finest form). Collect all leaves from trees and add them to the compost heap. Put by themselves, leaves take quite a year to decay, but they decay quickly when mixed with other rotting matter. I have many friends among the road-sweepers, and they dump cart-loads of stuff on us. Contrary to popular opinion, the little tar in road sweepings is quite harmless. It is only when roads are freshly tarred that any sweepings would be harmful.

If pigeons are numerous in your part, protect the brussels sprouts, young spring cabbages, etc., from them, for in a really cold spell they will strip them. The only way I have found that is effective is to run *three* strands of coarse black cotton over them, each a foot above the other and the first about six inches above the heads of the greens. One strand is useless for such large birds, but three strands thoroughly confuse and frighten them.

We thin our artichokes to three feet apart, so they make very stout stems. These we use as stakes their first season, and then they are put on the compost heap.

Sprouting Seeds Indoors

By Roger W. Smith

BEFORE the last of the snow has melted the Victory gardener begins working with many of the seeds he intends to use. If you try sprouting seeds and starting plants indoors you will find in doing it much of the pleasure of planning a successful garden.

It is a great economy to raise your own plants. Early in February, tomatoes, peppers, egg-plants, lettuce and early cabbage are often started indoors. You can also start sweet corn, snap and lima beans, beets, and even squashes, cucumbers and melons.

You will meet with more success in this pleasant task if you keep clearly in mind the two steps of the process. First, germinating the seed: requiring warmth, moisture, but not light. Second, growing the young plants: requiring all the light possible, plenty of plant food, some moisture, but not too much heat.

If you sprout the seed before planting it you will see what you are getting. A good seed germinator can be easily made by inverting a large glass jar on a piece of window glass upon which has been placed three or four layers of blotting paper made wet with a starter solution. The starter solution is easily made by filling a small container with mature compost humus and pouring water over it. This water when strained off is the starter solution ready fo use. The amount of starter solution taken should be replaced by pouring more water into the container with the humus.

Experiment has shown that seeds sprout more than twice as well when this solution is used. In the wild, the water which reaches self-sown seeds is always modified and enriched by the absorption of the

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solubles contained in the surrounding humus.

The seed to be germinated is placed upon the wet blotting paper and the jar inverted over it. The jar should fit evenly to prevent the seed from drying out and failing to germinate. The germinator should be kept in a fairly warm place—70 to 75 degrees Fahrenheit. Light is not essential.

Seeds having very hard coats, such as corn and morning glories, sprout more readily if a notch is made in their hard outer covering with a file. All seeds are benefited by a twenty-four hour soaking in the starter solution, before being placed in the germinator.

As soon as the seed has sprouted it should be planted in a seed box. This can be almost any small, wooden container. A cigar box filled with a fifty-fifty mixture of sifted compost humus and clean, washed sand is sufficient.

Properly made compost humus is free from plant disease and filled with the plant food and organisms most needed by new plant growth. The clean sand is added to increase the availability of this food and to assist drainage.

Planting the sprouted seeds in the seed box is easily done by placing them on the surface of the seed bed and pouring dry seed-bed mixture over them until they are buried to the required depth.

They can then be watered by leaving the cigar box in a dishpan containing an inch of starter solution until the seed bed shows signs of getting moist on the surface. It should then be placed in a sunny window and covered with a piece of clean window glass to prevent its too rapid drying out. The window glass should be removed at the first appearance of the young plants.

As soon as the seedlings have formed their first true leaves they should be transferred to more roomy quarters and held at a somewhat lower temperature. Home grown seedlings suffer more from improper drainage, too much heat, and lack of sunlight, than from any other causes.

From the cigar box the seedlings should be moved to a wooden tray about three inches deep containing rich, well-sifted compost humus. Almost any wooden box can be sawn down to form this tray. A few holes should be bored in the bottom for drainage. The seedlings should be spaced according to their kind, usually about two inches apart each way.

The tray should be fitted to a window where it will receive the most sunshine and remain cool to encourage the young plants to become stocky.

You will find it most convenient in filling this tray to first fill it with paper cups either forced into it so tightly that they become squares, or if loosely placed, with the interstices filled with humus. Then, when you move the seedlings to the tray each can be placed in its individual container. In this way, when the time comes to move the young plants to the garden, you can do it without greatly disturbing the root systems. For the larger growing plants berry boxes are good and for the smaller ones various types of paper bands.

Whenever it is necessary to water the young plants compost-water (the starter solution) should be used. In tests, it has been found that wheat seedlings grew three times as fast when the starter solution was used as compared with ordinary water.

If you are of the inquiring mind, you might try out a few seedlings in a container filled with just ordinary top-soil and moistened with ordinary water. Compare the behavior of these seedlings with those planted at the same time in a tray filled with healthy compost humus and watered with the starter solution.

See how much bigger and more virile those are that are growing in the sort of rich humus Nature intended for them and how weak and unhealthy those are that are attempting to grow in poor top-soil.

You should have little trouble transplanting sturdy plants to your garden when the time arrives. Avoid disturbing their roots more than you can help. Use the starter

solution when setting them out. Give them a little help when newly set out by protecting them for a couple of days if necessary against unduly strong sunlight or late frosts by covering them with inverted baskets or some similar method. Remember that a covering of heavy paper will keep frost away when a woolen blanket will fail.

Most garden vegetable seeds germinate readily but your interest in them might easily have carried you far afield by this time. You might get to wondering about germinating tree seeds. Walnuts, hickory nuts and the like are quite different from garden vegetable seeds. These need to be held through the winter in damp sand at a temperature slightly above freezing so that they may complete a process necessary to all seeds known as "after ripening." Some of them, such as the seeds of dogwood, holly, and juniper, often refuse to germinate until after the second spring.

Then again. you might have noticed that in the wild certain seeds fall, with their surrounding pulpy material, to the ground in the Autumn and are frozen with the natural humus forming in the woods at this time, to remain there until the Spring, such as wild apples, cherries. In this way you might have become suspicious that certain seeds, like those of the poppy and iris, germinate more readily after having been frozen. In this you are right.

Certain seeds, those of the pulpy fruits are benefited by being planted without removing the surrounding pulp. Poppy and iris seed, and perhaps many others, are often artificially frozen before being planted.

This is done by placing the seed in the water of a newly filled tray in a refrigerator and freezing the contents into cubes of ice. The seed is thus held in a frozen state for many weeks. When planting time arrives the ice cubes containing the seeds are planted in the ground.

In any event, your experience in raising a few trays of sturdy young plants for your Victory garden will have demonstrated to you that young plants thrive and are healthy only if grown in properly made compost humus, the material in which Nature intended them to grow. When you remember that your own health greatly depends upon the health of the vegetable material you consume, you will see how important this is.

By that much your little experience at starting plants and sprouting seeds indoors will have made your life a happier one.

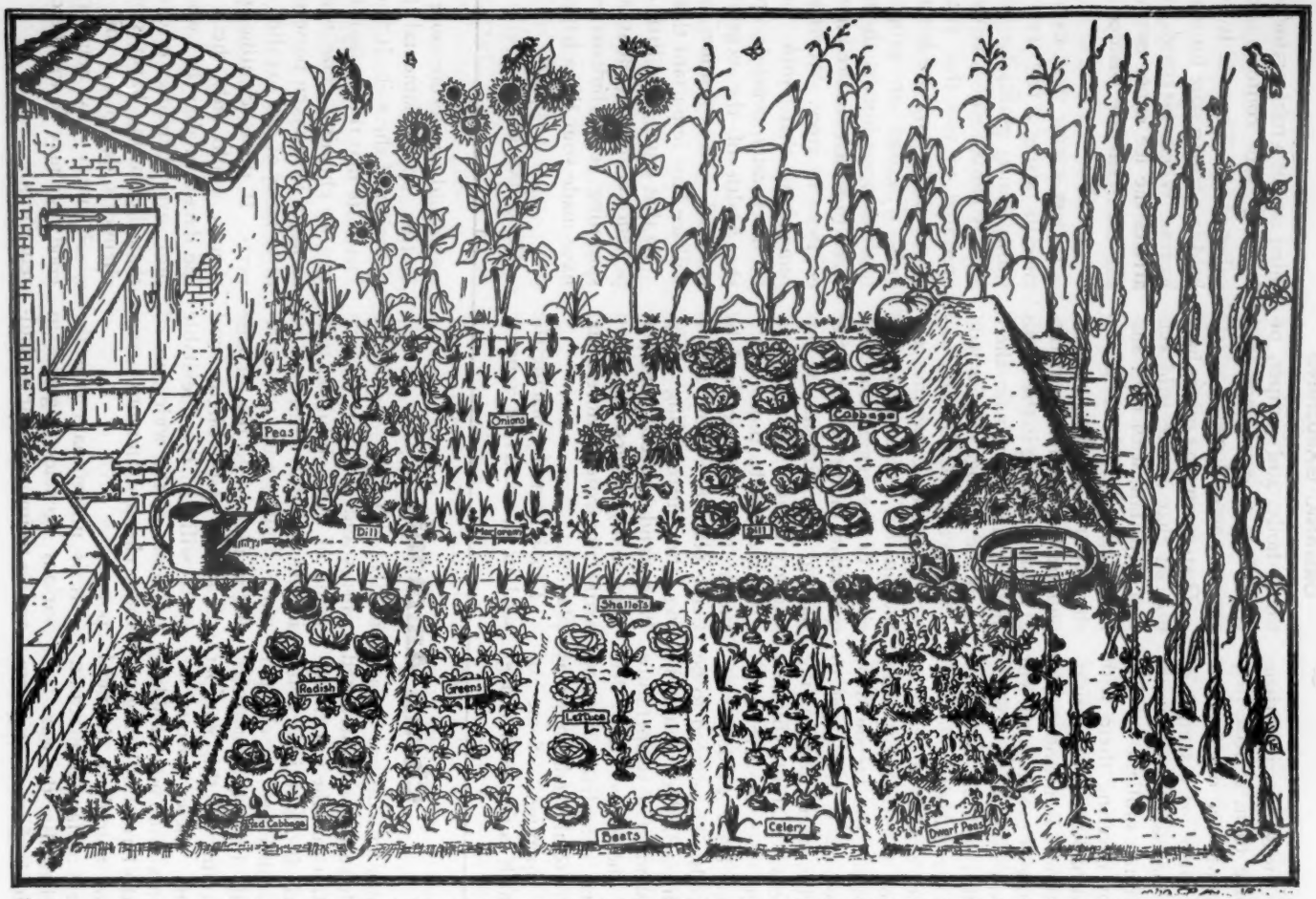
Good luck to you.

Cheap Ammonia

Various agricultural departments have become interested in the fact that the war emergency has brought into being the manufacture of cheaper ammonia in large quantities. As a result of this cheaper ammonia, these various departments are now holding out to the farmers alluring pictures of abundant chemical fertilizers at far more reasonable prices after the war.

As it is known that ammonia will kill the earthworms and probably a great many of the helpful bacteria in the soil, the prospects for more trouble with the growing of plants and the increase of insect pests, blights and rusts will be the inevitable out-come of the wider use of these cheaper ammonia compounds.

It is unfortunate that the various agencies engaged in trying to improve our agriculture could not devote more attention to fundamental fertilization of the soil. It is unfortunate that they cannot forget the chemical craze which seems to have taken possession of so many of our so-called experts. If these scientific gentlemen would only check on the data available they would find overwhelming evidence that the lasting harm strong chemicals do to the soil far overbalances any temporary good they may do for the current crop.



The relationship of rows—one to the other—is of utmost importance. Certain vegetables interfere seriously with the development of others and such vegetables should be widely separated. Some plants help repel harmful insects and many deep-rooted species actually aerate the soil for those which grow at a shallower depth. The above picture illustrates, on a small scale, an arrangement of a backyard garden that very nearly approches the ideal.

Crop Rotation and the Significance of Mixed Cultures in the Garden

The following article is of special interest to small gardeners. It shows how, in intensively cultivated areas one kind of vegetables may materially help another if planted in the proper place. This is taken from "Grow A Garden and Be Self-Sufficient" by Dr. Ehrenfried Pfeiffer and Erika Riese (Anthroposophic Press Inc., New York) Dr. Pfeiffer, former Director of the Bio-chemical Research Laboratory at the Goetheanum, Dornach, Switzerland, conducts the Kimberton Farms Agricultural School, Kimberton Farms, Phoenixville, Pennsylvania.

IN the forest, in the meadow, in every wild plant association, there is a colorful mixture of plants, which, in accordance with the soil type and local climatic conditions, are able to live together and mutually complement one another. We often speak of a "natural plant association." The substances resulting from the decomposition of the plants, the excretions of the animals and all decaying organic matter, care for the formation of natural humus, which is held fast by the roots of the plants and utilized by them. The plants in many regions associate in such a varied manner, that blossoms, green leaves and fruits hang next to one another, at every season, up to the time of killing frosts.

A secret life then hides itself in the subterranean rootstocks, bulbs and tubers of the perennial plants, in the slumbering eyes of the trees and shrubs. It lies there ready to push forward again with the increasing warmth of Spring and manifest itself anew in growing and blossoming.

The conditions are quite otherwise in cultivated land, in the field and garden. Here, in the course of *one* period of vegetation, plants are cultivated which for the most part do not even become completely ripe, aside from grain and certain fruits. They are supposed to develop the greatest possible leaf mass, as, for example, cabbage and spinach, or, as in the case of turnips, to form large roots. The plant thus makes great and often truly one-sided demands on the soil. Cultivation of the soil and fertilizing are therefore necessary, the first to aerate and open up the soil, the second to supply nutritive substances and maintain a balance. The plants must alternate with one another in a succession which uses the ground without robbing it, and lets it rest again at intervals, so that it is not made one-sidedly poor in nutritive content. This means that we must use a crop rotation.

In horticulture plants are classified according to their requirements and their more or less one-sided utilization of the food substances in the soil. They may thus be divided into heavy feeders, light feeders, soil conserving and soil improving plants. All plants which need a heavy fertilizing with stable manure are *heavy feeders.* They can also utilize

applications of liquid manure. Entirely fresh, untreated manure or liquid manure are not used, however, even for them. The heavy feeders are planted immediately after fertilizing. We speak of them as belonging in the "first rank." The most familiar heavy feeders are all the cabbage varieties, cauliflower in particular, all leaf vegetables such as chard, head lettuce, endive and spinach, as well as celery and celeriac, leeks, cucumbers, squash and sweet corn.

Rhubarb and tomatoes are also decidedly heavy feeders, but are not included in the crop rotation since rhubarb is a perennial and special rules apply to tomatoes. Berry bushes and strawberries likewise require a rich, but not a fresh manure.

The heavy feeders can be followed by legumes. To these belong pole beans, peas, sugar peas, broad beans, shell beans, lima and soya beans. They bring about the recovery and improvement of the soil which has been depleted by the heavy feeders. By means of their deep growing roots legumes open up lower soil levels and bring nutritive substances which may have been washed down (lime for instance) to the surface again. The roots of many annual legumes reach to a depth of 2 feet; perennial types go even deeper, alfalfa and sainfoin reaching a depth of 6½ feet in a deep soil. By means of the nodulé bacteria on their roots all the legumes capture the air's free nitrogen. In this way they provide for necessary nutritive materials and produce supplementary fertilizer.

In a very run-down soil, we should always put the legumes in the "second rank" and plant them directly after the heavy feeders. In a live humus soil they can remain in the "third rank," in which case a light compost fertilizing benefits them.

It would really be more appropriate to call the *light feeders* "compost lovers." They cannot stand heavy fertilizing with strong stable manure or fresh manure, which cause a rank, coarse growth. Instead, they should be fertilized with good compost. We are dealing here with bulbs and all root vegetables, such as carrots, beets, radishes, etc. They stand to best advantage when placed in the "second rank."

Annual and perennial aromatic herbs help to conserve the soil and "enliven" the vegetable garden, which blossoms relatively little. These, also, can stand only compost fertilizing.

There are still some plants to be mentioned, which, because of the peculiar character of their growth, their scent and their root formation and soil demands, have a beneficial effect upon the garden. These can be used for border plantings. We are thinking here, chiefly, of sweet corn, sunflowers and hemp, which form a good annual hedging for the garden. Despite the fact that they make strong demands on the soil, they can be considered biologically useful plants. Because of its peculiar odor, hemp acts as a deterrent on the cabbage butterfly. This is very useful in the flight years of this butterfly. Sunflowers attract the tomtits, which then proceed to hunt grubs and insects. Bees also enjoy visiting them. If we allow the herbs in our garden to go to seed the bees and all kinds of useful insects have a great feast while they are in blossom. Blossoming hyssop, thyme, savory and borage form a good, healthful bee pasture.

Soya beans and lupins are the plants which leave behind them the finest, most friable soil.

It is not a matter of indifference in what associations plants are grown. We need only think how the shallow-rooting and deep-rooting plants supplement one another through the differentiation in their root systems. The legumes, for example, promote root growth in their neighborhood through the aeration of the soil resulting from their own deep-growing roots. It has been observed that beets and kohl-rabi grow very wretchedly near pole beans, if planted too late and consequently shaded by the beans. Between cabbages they thrive well, even in a very cramped and heavily shaded position. Another unfavorable combin-

ation is tomatoes and kohl-rabi. If they are planted together, the one planted last generally suffers. Similarly, fennel and tomatoes cannot stand one another. While we value sunflowers as a border planting, along a path, a lane, or a meadow, it is not good to plant them near potatoes. We run the risk of having stunted vines and small potatoes, especially if the sunflowers develop luxuriantly.

Cabbage and beans, beets and onions, celeriac and leeks, cucumbers and sweet corn are counted among mutually beneficial combinations. (Corn can be used as a border planting or may be planted in a neighboring bed.) Beans are also not harmful when planted in the immediate neighborhood of celeriac and leeks. However, if we plant beans too thickly between celeriac and leeks, all three are generally stunted. Further beneficial associations are carrots and peas, cucumbers and beans, kohl-rabi and beets, onions and beets, early potatoes and corn, early potatoes and beans, early potatoes and horseradish (the latter as a border), tomatoes and parsley, bush beans and celeriac, and cucumbers and bush beans. A harmful association is fennel and bush beans. There is still much to be investigated in the field of plant symbiosis. We would like, therefore, to urge that the gardener observe and note his own experiences for future reference.

The sense of companion cropping now becomes clear. Above the soil as well as under it, the neighboring plants supplement one another. For example, the upward striving, two-dimensional leek finds enough room near the bushy celeriac plant. Both are potassium lovers and prefer, therefore, well-rotted pig manure. The intercropping of various plants is conditioned by their similarity in soil demands and difference in rate of development. Lettuce and kohl-rabi, for instance, have short seasons of development and cover the ground as long as the plants which mature later cannot yet do this. After the inter-crop is harvested the later maturing plants remain with plenty of room in which to develop.

Mixed cultures not only give the advantage of a permanent ground cover, which prevents crusting and drying out, but also help to hold the weeds in check. Besides, they have a marked influence on the quality, keeping quality, and flavor of the vegetables. We suggest the following simple experiment as a test of the validity of the preceding statement. Plant 2 or 3 rows of radishes and beside them 2 or 3 rows of garden cress; in a second plot, nearby, use chervil as a border; then, lastly, plant a few rows without a border, as a control. You will be able to detect marked differences in flavor:

Radishes without a border: relatively tasteless.

Radishes with a border of chervil: sharp.

Radishes with a border of garden cress: very tasty.

Luther Burbank

The name of Luther Burbank stands out in American horticulture as a symbol of progress, successful experimentation, and the achievement of new varieties of flowers, fruits and vegetables. But an examination of his record shows no dependence on "bath-tub farming" or high-powered chemical fertilizers. When he began his work on his four famous acres at Santa Rosa, California, he loaded down this soil with eighteen hundred loads of barn manure. In those days, barn manure was plentiful and cheap. Today, things are different. Therefore the average gardener must do the next best thing and that is to concentrate on making his own non-chemical manure through the building of compost heaps out of whatever waste organic matter may be available. Compost-making does require work—fairly hard work—but the results achieved from the use of compost fertilizer justifies that work many, many times over.

The Beneficial Earthworm

THERE is no question but that earthworms and the part they play in nature's scheme of things, are attracting more and more attention from thoughtful gardeners each day. When Charles Darwin wrote his historic book, "Vegetable Mold and Earthworms" back in 1881, the world at large looked upon these revelations with undisguised skepticism and permitted these disclosures to go unheeded.

Today, however, enterprising gardeners have begun to realize that the presence of earthworms in their soil is more than a mere happen-so. They understand that these worms do not constitute a nuisance but in truth they contribute much to true soil fertility. Yet, even so, it is difficult for many persons to appreciate the fact that a garden is productive in direct proportion to its number of earthworms—that a garden with say 100,000 lively, working earthworms should produce double the crops of a garden of the same size with a cultivating force of only 50,000 earthworms.

Now these figures are not the theoretical effusions of high-brow efficiency experts who depend for their knowledge on the sliderule and the drafting board. These figures are based on the scientific studies of Charles Darwin and the data collected by the handful of scientists who, since his demise, have been giving close study to the earthworm's part in soil fertility.

So no matter what your personal opinion may be, play safe and conserve the earthworms in your garden. You will prove to your own satisfaction that this care is more than worthwhile when you check results next fall. Make your soil so rich, in humus or compost or loam or whatever you wish to call your particular type of organic matter, that the earthworms will thrive in it. Above all, do not use those things, those chemicals, those sprays, that kill these worms. If you do, you will have unfortunate surprises in store for you that will really take the heart out of your enthusiasm for raising your own garden truck. We don't say that chemical fertilizers draw insects, blights and rusts but we do say that where these chemicals are used, the insects, blights and rusts seem to congregate. We do make the statement, however, that these strong, poisonous chemicals in the soil kill the beneficial earthworms and prevent them from performing their allotted tasks. Just remember: the earthworm aerates your soil—lets the needed air in to the roots of your vegetables; the earthworm, through its countless burrows, allows the surface moisture to seep into the lower subsoil—which will prove a boon to those thirsty roots during the hot days of August: the earthworm, working far below the surface, brings up to within reach of the roots of your vegetables many minerals your plants require for their growth, and lastly: the earthworm, dying, gives to the soil much valuable protein, without which no vegetables can flourish.

GROWING EARTHWORMS

It is not much trouble to grow one's own earthworms, either for home fishing during the dry summer months, or to sell to other fishermen. An energetic boy near a stream where bait is in demand will find it a good money-making project.

Get a large steel barrel from

some filling station and wash it thoroughly until all the oil is removed. Sink it in the ground until only the rim shows and fill it with the kind of dirt that worms favor. Put in a good supply of worms, keep the dirt moist with water, and feed them coffee grounds and water in which vegetables have been soaked or cooked. They will grow and multiply of their own accord. Holes should be in the bottom of the barrel, and the top may be kept covered. Several barrels may be used, if the demand for worms is great enough.—*Southern Sportsman.*

The following are a few questions regarding earth worms that have come in to this publication. The answers were supplied by experts of the California Earthworm Farms, Ontario, California.

Question: How may earthworms be supplied to the open fields?

Answer: By the use of manure spreader if this is to be done on a large scale. In this case, worms should be cultured in compost piles. On a small scale, broadcast the earthworm culture, or plant small colonies at regular intervals.

Question: What precautions should be taken in using fresh manure in earthworm culture beds?

Answer: Mix thoroughly with soil and humus to prevent heating.

Question: Are wood ashes harmful to earthworms?

Answer: No, on the contrary, they supply additional food. Coal ashes, however, are harmful.

Question: Why is organic material of such importance in the culture of earthworms?

Answer: It provides food for the earthworms, raw materials for their soil-building activities, and protection from the direct rays of the sun.

Question: Do earthworms injure or eat plant roots?

Answer: No, they not only do not injure or eat them, but they make the soil porous and permit a more vigorous root development.

Question: Is it difficult to introduce the domesticated earthworms into an orchard or garden where there is an insufficient number of native earthworms?

Answer: No, it is quite easy and inexpensive and ties in with organic farming methods and principles. The addition of humus or organic materials encourages earthworm propagation.

Question: How long does it take the egg capsules, or cocoons to hatch?

Answer: Approximately 3 weeks, depending upon climate, moisture, specie of earthworm, etc.

Question: Of what advantage are earthworms in the compost piles?

Answer: They help in a more rapid breaking down of the compost and create an absorbent condition permitting greater water storage.

Question: What foods are harmful to earthworms?

Answer: Strong acids and chemicals, eucalyptus and pepper leaves.

The "Thin Wood" Method of Pruning Bearing Apple Trees

By H. P. Gaston

THIS is the new, scientific and revolutionary method of pruning bearing apple trees. There is no reason why it should also not apply to other fruit trees such as cherries, peaches, pears, etc., but so far no actual tests are available for comparison. However, in the case of bearing apple trees, this "thin wood" method of pruning has passed the "theory stage" and is now safely classed as "practical and usable." Frankly, while this new system will be found of inestiable value to the most highly-scientific orchardist, it will be even more welcome to the small gardener who does not know how to correctly prune a fruit tree. There is plenty of information available as to just how to better the shape of a tree by pruning but mighty little about the effect of improper pruning on the bearing ability of the tree. All parts of the tree do not yield the same amount of fruit and improper pruning, while it may improve the appearance of the tree, may cut down the yield to a large extent for several years to come. For that reason, the following article taken from the abridged report of experimental work done by G. L. Ricks and H. P. Gaston, a more detailed account of which was first published under this same title in November, 1935, as Special Bulletin 265 of the Michigan Agricultural Experiment Station, should prove interesting.

Experienced fruit growers are often misled by the fact that apple trees respond to moderate-to-heavy pruning of their tops by sending out vigorous new growth and by bearing apples of improved grade. Few of those men realize that the productive capacity of the new growth is less than that of the wood removed or that, although heavy pruning may improve grade, it also reduces yield.

Hundreds of growers prune their orchards regularly with the firm conviction that their trees are being benefited and their own profits increased. In many cases a careful check would prove that these men are destroying a considerable percentage of their best fruit, thereby materially reducing monetary returns.

Unforunately, the more industrious the ill-advised pruner, the more work he does and the more trees and his profits suffer. There is an obvious need for a pruning method which will increase size and color without at the same time reducing the yield of the better grades of fruit. Such a system has been devised and is here designated as the "Thin Wood" method of pruning. It is not only easier and less costly than methods formerly employed, but substantially increases the monetary returns of those growers who adopt it.

It has long been known that differences exist in growth habits and in the general character and amount of fruit produced in different parts of the tree. To prove this conclusively each of a number of trees selected for study of production was arbitrarily divided into three sections: "Inside," "outside," and "top."

It was found that:

1. The top and outer portions of apple trees were much

more productive than were the lower and inner portions.

2. The grade of fruit produced by the top and outside was superior to that produced by the inside.

3. The apples produced by the top sold for almost nine times as much as did those produced by the inside.

4. Considerable differences existed in the productive capacity of different branches.

As a part of this study of production it was found that considerable differences exist in the bearing qualities of various branches.

Branches were classified as "Thin," "Intermediate" or "Thick" and it was found that:

1. "Thick" branches yielded three times as many apples as did "Thin" branches.

2. "Thick" branches bore apples which were almost half again as large as those borne by "Thin" branches.

3. "Thick" branches yielded more than four times the amount (by weight) of fruit produced by "Thin" branches.

4. "Thick" branches bore more than ten times as much fruit of U. S. No. 1 color grade as did "Thin" branches.

The facts brought out by the branch studies led to the conclusion that a system of pruning, in which only weak and relatively unproductive branches were removed. would:

1. Eliminate many small, poorly colored apples that would otherwise be produced.

2. Enable the tree to produce more fruit of large size and good color.

Reduced to its simplest terms: "Thin Wood" pruning consists of removing from the tree the "thin" or slender, relatively unproductive branches.

The four most outstanding characteristics of "thin" wood are:

1. *Relatively small diameter.*

2. *Short terminal growth.*

3. *Tendency to grow in a downward direction.*

4. *Most "thin" wood is found in the lower, inner part of the tree.*

Although the same results may be accomplished in any one of several different ways, the author usually divides the work of pruning a given tree, by the "Thin Wood" method, into three steps.

The First Step

There is in almost every bearing tree that has not been previously pruned by the "Thin Wood" method, a number of comparatively large limbs which give rise to a number of smaller branches virtually all of which are of the "thin" wood type. Though some of these branches may grow more or less upright, most of them are usually found growing in a horizontal or even downward direction. The weight of a crop of fruit pulls the extremities of such branches toward or even to the ground, where the fruit may be damaged. As a first step, the large branches, most of whose laterals fall into this class, are removed. This is done with a saw. The first cut is made at the most convenient point, after which the worker proceeds around the tree, making all the necessary cuts of this type. The removal of these branches makes the subsequent work easier. Sketches, (Fig. 1) showing the tree in cross-section before and after the saw cuts have been made, will help the reader better to visualize the first step.

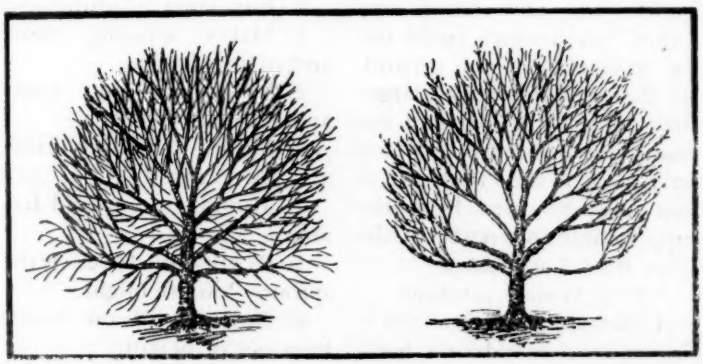


Fig. 1.

The Second Step

After having made the saw cuts just described, the writer prefers to discard the saw and do the work which remains with lopping shears, though some may prefer to use hand shears or continue with the saw. With the lopping shears, this time removing the "thin" wood which still remains in the lower center. Sketches showing the tree before and after the ground lopper work are shown in (Fig. 2.)

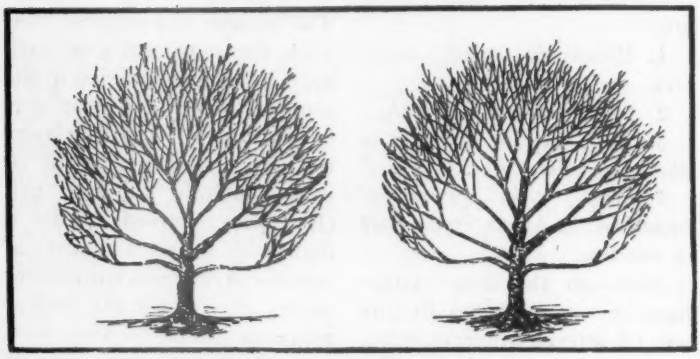


Fig. 2.

The Third Step

Most of the work is done in what is here described as the first and second steps, and in the case of younger trees it only remains for the worker to step up on the lower branches of the tree and remove any "thin" wood which could not be reached from the ground. In the case of older and larger trees, some climbing and the use of a ladder may be necessary. When the "thin" wood has been removed from the upper, interior part of the tree, the job is finished.

"Thin Wood" pruning:

1. Requires less time and is less costly than older methods. the worker moves once more around the trunk of the tree,
2. Improves the color grade.
3. Increases the average size of fruit.
4. Reduces the yield of inferior fruit.
5. Increases the yield of the better grades of fruit.
6. Increases monetary returns.

"Thin Wood" pruning also:

1. Makes spraying easier and more effective.
2. Makes thinning easier and cheaper.
3. Makes harvesting easier and less expensive.
4. Minimizes sun scald hazards.
5. Results in fewer water sprouts—less fire blight.
6. Does not throw young trees out of bearing.
7. Is adapted to bearing trees of all ages.
8. Makes several pickings less necessary.
9. Minimizes frost hazards.

Thus the small gardener will see that there is much more to successfully pruning fruit trees than an artistic eye and a pair of lopping shears. Each tree should constitute a study in itself and the removal of surplus limbs should depend entirely upon their kind and their relationship to the rest of the tree.

Though the general principles of the system of pruning that has been described find ready acceptance by growers, there are points on which additional information is sometimes requested. Some of the questions most frequently voiced are here stated and briefly answered.

1. *Can the "Thin Wood" method be applied to trees of different ages?* Yes. The "Thin Wood" method of pruning is one which may be used with confidence in pruning bearing trees of all ages. Because only that wood which would otherwise bear inferior fruit is pruned out, the amount of wood which should be removed can be determined by observing the quantity of small, green apples produced.

2. *Does not "Thin Wood" pruning push the bearing surface to the outside and cause a hollow-centered tree?* No. It is true that the bearing surface of "Thin Wood"-pruned trees is largely confined to the out-

side and the centers contain little if any bearing wood. It should be remembered, however, that essentially the same thing is true of all older trees regardless of pruning treatment. This condition, therefore, is not the result of "Thin Wood" pruning but of natural growth habits.

3. *Is not the top of the "Thin Wood"-pruned tree larger in proportion to its roots than it should be?* No. Because "Thin Wood" pruning is pruning of a relatively light sort and as the cuts are confined to branches which, if left, would in the natural course of events die, the system does not materially affect the natural balance which exists between roots and tops.

4. *Are not losses from breakage in "Thin Wood"-pruned trees greater than in conventionally-pruned trees whose tops are thinner?* No. Although the author found no satisfactory means of measuring this factor quantitatively, he did observe that the amount and severity of breakage was usually greater in conventionally-pruned trees.

5. *Does "Thin Wood" pruning call for the thinning out of tops which are very thick?* No. Even very thick tops need not be thinned if the wood of which they consist is vigorous. No matter how thick the tops may be, the vigorous branches will not only produce apples of larger size and better color, but will produce more of them than will the branches in other parts of the tree. This means that thick tops should be encouraged rather than discouraged.

6. *Does "Thin Wood" pruning call for the removal of parallel, crossing, or interfering branches?* No. Thick productive branches should be allowed to remain even though they may cross, be parallel, or interfere. Only when two branches rub or interfere to the extent that one is injured so severely that it assumes the characteristics of "thin" wood, should it be removed, and not before.

7. *Will "Thin Wood" pruning cause a tree to grow too high?* No. It can be said with confidence that "Thin Wood" pruning will not cause a tree to assume a more upright habit of growth or to attain a height appreciably greater than that which is natural to the tree.

8. *What will a tree look like after 30 years of "Thin Wood" pruning?* If the space has been such that the tree could develop naturally, it will be a large, spreading tree of great productive capacity.

Some growers fear that though the "Thin Wood" method may, for a time, be satisfactory, it will eventually result in a tree of undesirable form. Such is not the case. A few Michigan growers have for many years practiced systems of pruning which, although unnamed by them, are in many respects essentially the same as the "Thin Wood" method, and the trees are of good form.

The Compost Heap

Question: *What time of year is the best time to start a compost heap?*—Mrs. E. F. G.

Answer: Anytime at all. Of course, if you live in a cold climate you will not be able to make your compost mature until the warm weather comes to thaw it out and allow the bacteria to do their work. On our experimental farm we make compost piles whenever we have material available but in cold weather we have to wait until they thaw out before any turning can be done.

Question: *Can a compost pile be wet too much?*—J. L.

Answer: It certainly can.

Too much water actually washes away a great portion of the valuable minerals. A compost heap should be kept wet—yes, very wet: It should be as wet as a squeezed out sponge. For simplicity let me say that it should have all the water it can hold—without losing any of it through running away at the base of the pile. As soon as a compost pile "runs water" it is far too wet.

Question: *Is the turning of compost heaps absolutely necessary?*—H. M. H.

Answer: If you wish to gain time, the turning of the heaps must be done at the stated periods. Of course, if you do not turn the heap, they will, in due time, become compost. The instructions for the regular turning of compost heaps are as follows: First turn: at the end of three weeks after completion. Second turn: five weeks after the first turn. No other turnings are required.

Question: *How long should the compost heap age after the second turning?*—I. E. Leg.

Answer: Actually about four weeks after the second turn.

Question: *Why should a compost pile be built up on branches, or the like. Why not on the ground without any foundation?*—W. E. H.

Answer: The reason a compost pile is built up on a foundation of branches is to raise the pile slightly from the ground to allow the air to get under it. The bacteria which cause the decomposition of the material in the pile must have two elements present to be able to work effectively—the first is plenty of moisture and the second is plenty of air. That is why the ventilation holes are put in the pile when it is first made and also when the first turn has been completed. These holes—about three feet apart along the top of the pile—running down to the ground and about six inches in diameter—are for the purpose of allowing air to get to the bacteria in the center of the pile. Without air this helpful type of bacteria could not live and other bacteria—causing the pile to turn acid—or mildew—would take their place.

Question: *I have a small garden. How large a compost heap should I construct?*—G. A. K.

Answer: The dimensions of a compost pile depend on many factors—the amount of space you have for it and the amount of material you have to make this pile. The ideal compost pile is about 4 feet high when first constructed. The sides slant up slightly to the top so that the base—probably 6 feet wide—has narrowed until the flat top is about 3 feet wide. The length may be any that you desire.

Question: *What is the best tool to use in order to turn the compost heaps?*—L. J. M.

Answer: A digging fork. The slices cut should be approximately 9" deep by about a foot square. Be sure to turn the outside portion of the pile into the inside so as to give it an opportunity to be acted upon by the bacteria.

Question: *Why should I pile up my compost heap so carefully. What if I just dumped my earth, manure and vegetable matter into a pile? Would that work out?*—R. J. H.

Answer: Please remember, the Indore system for making compost is very old and is no longer an experiment. If the "sandwich" plan was not the best—it would have been superseded by some other long ago. It would be wise to follow the Indore instructions. The first level—on top of some branches for a foundation—is a six inch layer of organic material—hay, leaves, straw or other vegetable material. On top of this—the second layer—is two inches of manure, or kitchen waste, fish cuttings, including bones, etc. Any sort of protein material such as beef blood or bone dust will do. Mixed with this layer is a sprinkling of lime—a sprinkling, no more—or of wood

ashes. On top of this—the third layer—is one of earth, the blacker and richer the better. This layer may be anywhere from two to four inches thick. The rest of the pile is made simply by repeating the first, second and third layers in the same rotation as many times as needed until the desired height of say 4 feet is reached.

With Sir Albert Howard

To Sir Albert Howard
Windways, Heversham. Milnthorpe, Westmoreland, England
From J. I. Rodale, Editor
October 14, 1942

On our farm we have been experimenting with a new type of a compost mixer which we hope will eliminate a great deal of the labor involved in the periodic turnings. This time our construction is in the shape of a large hexagon wooden box lying horizontally on an axis. By turning this axis with a handle it will be possible to rotate the box. The reason the hexigon shape was used was to make the box as nearly round as possible but with enough angles to the bottom so that the material inside would not merely slip around when the box was rotated instead of mixing up. The box is about four and one-half feet in diameter. It will hold about 9 square yards of material. By its use we hope to be able to turn the compost in it frequently. These many turnings may hurry up the compost making and better the 3 months required by the Indore Process. In estimating the 9 yards of material, we are calculating on the box filled four-fifths full. Also write on my corn problem.

Answer

I like the idea of the hexagonal box, but the difficulty will be its weight when filled to four-fifths of its capacity with a composting mixture. It might be necessary to strengthen it by means of angle iron both longitudinally and transversely. I am afraid that a box made of wood might break, or at any rate would soon get out of order, whereas if there were a metal base, so to speak, it would stand the strain very much more easily.

I think a rotating box would have to have such a very strong axle that we should run into a great deal of expense, but it is quite possible this might be the solution. There is nothing like trying out these particular things and basing the final result on experience; indeed that has always happened to me.

I have already dealt with the point you raise about reducing the labor. This can be done by greater care in the original mixture. If great care is taken in assembling a heap which, we will say, finally settles to a height of about 4 feet, turning could be avoided if the upper 2 feet were used first and the lower portion used after an interval, because my experience always has been that it is the portion of the heap nearest the atmosphere which ripens first, because air will percolate into a fermenting heap to a depth of about 18 to 24 inches quite easily. The result is the upper portion is ready, but the lower portion is not, so that if the upper portion is shoveled off first and the lower portion is left for another month, we might get very useful results in this way.

With regard to your treating an area destined for maize (corn) with vegetable wastes, the results will depend on the fertility of the soil; as your land becomes very rich in humus you will find that it has the capacity of eating up almost any vegetable wastes when laid on the surface, but if your land is not fertile the best results are obtained by spreading farm yard manure or compost on the top of the wastes and ploughing the two in together, or even leaving

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the mixture on the surface. A good deal of work in this direction has been done by some of the planters in Kenya, one of whom wrote to me some time ago that he had got his plantation so fertile the soil would eat almost anything thrown at it from a gunny-bag to maize stover.

To Sir Albert Howard
Windways, Heversham, Milnthorpe, Westmoreland, England
October 20, 1942.
From J. I. Rodale, Editor

Lately I have come in contact with a certain type of patented bacteria which is supposed to hurry decomposition of the compost heap. Do you believe such a preparation is necessary?

Answer

In this composting business I am always reminded of that quotation from the Bible that "Wheresoever the body is, thither will the eagles be gathered together"—whenever half a chance of selling some machine or some patent bacterial culture comes along there is always a vendor ready to turn an honest, or rather a dishonest, p e n n y and make money out of a good idea.

As I said in my previous letter, the labor can be saved in compost making by a careful assembly and mixing of the materials. In this connection you will be interested to know that as the soil becomes fertile its digestive power as regards organic wastes laid on the surface increases very rapidly; a time comes when a fertile soil will eat almost anything when spread on the surface. These are, I believe, the bacteria which are involved in the patent culture to which your letter under reply refers. You must not fail to let me know the results of any trials you make with this material, as I am always ready to learn and to adopt anything which will improve the Indore process.

Reader's Correspondence

— *Compost in Missouri* —
From H. A. Lane
Tulsa, Oklahoma
January 13, 1943.

Your magazine is valuable and I want to have every copy that I can get. It, with the biodynamic movement generally represents a viewpoint quite at variance with the orthodox traditional attitude which has developed in our American farming methods. I do not mean to say that we are immune or opposed to new ideas or methods, but the practice at present seems to be overwhelmingly weighted with the influence of commercial high pressure salesmanship—as in

the field of fertilizers, farm implements, sprays, synthesized foods, and other lines. And the teaching seems to follow in the same line. I have noticed the growth of such influence since my college days,—when I attended Iowa State A. & M. college at Ames. Also my boyhood experience in the Corn Belt gave quite a lasting impression.

On the farm which I have in Southern Missouri, the war situation has prevented the tenants from applying to any great extent the bio-dynamic methods,—but the compost method has been used. However I am hoping ultimately to be able to take active charge of the work and follow as far as possible the organic methods advocated by your publications.

* * *

Insect Pests

From Donald W. Drushell
Nova, Ohio
January 8, 1943.

Can you send me any information on how to care for an orchard without using poison sprays?

Answer

Frankly, Mr. Drushell, we wish we could write you a few simple rules which would enable you to have an orchard entirely clear of insects, rusts and blights next year. Unfortunately, we cannot do so. However, we are enabled to tell you that on our experimental farm here in Eastern Pennsylvania we are making some really worthwhile steps forward in the eradication of insects and plant ailments through proper fertilization.

It is much easier, however, to transform a garden in a single year where the plants have to grow from scratch, than it is to revitalize trees in an orchard that are perhaps 15 or 20 years old. It is almost like attempting to make old Rip Van Winkle into an Arrow Collar ad. Nevertheless, we are enabled to tell you that through the copious use of compost, and a deep mulch you are enabled to give to your orchard trees many additional minerals, and in quantities that are required by nature. When this has been done you will gradually see a change in your insect troubles. The first year the change will probably not be so marked, but from the second year on you ought to see a material decrease in not only insect pests, but also in rusts and blights.

As we stated above, in the case of common gardens, there came into my possession today two photographs taken in New York state showing adjoining bean fields. One bean field had been fertilized through the use of compost, or natural methods, and the leaves and stalks of the plants were passed up by insects which attacked the beans on the adjoining field, and made lace

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curtains out of all the leaves. The fertilizer used on the adjoining field was ordinary fertilizer and was not organic.

You have raised a big subject, and we hope through the coming years with our experimental farm to absolutely prove—and prove beyond peradventure, that insects, blights and rusts can be banished forever from agriculture through the mere balancing of the food that is taken up through the roots of the plants.

* * *

Health and the Soil

From Milford C. Hunsley
Springfield, Illinois
December 26, 1942.

Nearly five years ago we discovered, through a friend, the way to health by following natural methods of living.

In all our study of natural methods of living we do not remember of a single writer who has stopped to analyze the soil conditions in which the food was produced. I can see now that this should be of major consideration. If the life giving elements are not produced in the foods we eat how can we expect to obtain these essentials? This is the important part your magazine devoted to "back to nature in agriculture" plays in advancing the common cause of health.

The average man looks to science with all its complexity for things which are given without cost by Mother Nature. The requirements for qualification are simple. Man must think in humble terms which will enable him to understand these natural methods so he can accept the things that were intended for him.

Answer

What you say about natural methods in taking care of human ailments being closely linked to natural methods of agriculture is absolutely true. But few persons realize that fact. The health food stores, the health food lecturers and the health food magazines have been holding the center of public attention as far as health by natural methods is concerned. These organizations got there first—they realized that something was wrong with our civilization and as far back as 1898 Dr. Benedict Lust set up a cry in the wilderness for an improvement in our views on the causes of ailments and disease. Since that time, Dr. Lust has been joined by quite a crowd of enthusiastic supporters—most of whom have branched out on individual lines of their own—instead of all joining together for a radical change in our health views. The matter of the soil—and how closely it was related to health—has been sadly overlooked in this campaign of chiropractors, osteopaths, naturopaths, etc., etc., but now a realization is being had of the incontroveri-

ble fact that without the minerals being present in the soil to supply adequately the food that is grown, all the health foods, all the lectures, all the reading matter will avail you little as far as maintaining or regaining your health.

The foundation of health—yes, and of all ill-health—is in the minerals that the soil contains. It is an open and shut proposition and we hope, through the readers of Organic Gardening and the experiments conducted on our 63 acre experimental farm here in Eastern Pennsylvania to prove that proposition conclusively.

* * *

Box Compost Heap

From William Peabody Smith
83 Woodward Avenue
Rutherford, N. J.
January 4, 1943.

There are probably several hundred thousands of families which have a cubic foot of garbage per week all the year round—but grass cuttings and weeds only in the summer and never any animal manure—what can they do? Isn't it possible to have some sort of a small compost pile that would suit their needs?

Answer

There certainly is a way that these small gardeners may utilize this kitchen waste. They may construct small compost heaps. One 5 by 5 feet at the base with a height of 4 feet is the smallest type that is practical because a smaller heap would dry out too quickly and could not, under ordinary conditions, work up an interior heat sufficiently high for the proper growth of the helpful bacteria. Of course, smaller compost heaps can be made right in your own back yard if you will take a large wooden box, bore holes along the sides and bottom to let in the air, and build your compost heap in layers as described in Organic Gardening. This "box compost heap" has worked very successfully in all parts of the world. But it will *not* work without the holes along the sides and bottom. In fact, some sort of a lattice construction, in the shape of a box, would be even better.

Kitchen waste is just as good as ordinary stable manure for use in compost heaps. In such kitchen waste will be found the necessary protein elements generally missing from leaves, grass, etc., and which heretofore have been supplied through the use of manure. In kitchen waste are scraps of meat, bones, marrow, fats, and whatnot. Chicken feathers, fish skins, etc., all add their portion of protein. So, make your compost heaps—and if you cannot get manure, use kitchen waste instead. Of course, if you can obtain some refuse from the slaughter house, or the entrails of fish, heads, etc., you will enrich your compost immensely.

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— Subscriptions to Friends —

From Mrs. Dave H. Morris, Jr.
Orchard Point Farm
Chestertown, Maryland
January 15, 1943.

I have just read your December 1942 issue from cover to cover and think it a grand publication. It is a subject which more people need to know more about. I would therefore like to give a 6 months subscription including the pamphlet on the Indore Method of Composting to three of my friends whose names and addresses I enclose.

★ ★ ★

— Earthworms —

From H. Skadsheim
Nevada, Iowa
January 10, 1943.

I have been wondering if the study of the earthworm is not the solution of the problem of animal media, for the city dwellers who cannot get manure from the larger sources. If they add earth with earthworm castings, in the compost heaps, that should take the place of other manures. I see that Mr. Haskell points out this problem, but I believe you are on the right track for solving this problem for city dwellers, by getting them to combine the earthworm farming and the composting heap. It seems that Sir Albert Howard does not go into this phase of it, so there is another line to experiment on. Where there is a problem, there is opportunity.

Answer

What you say about the earthworm being the possible solution to the fertility proposition of farms and gardens may be true. That the earthworm does supply certain protein elements to the soil no one can deny. In the forest—in the pasture—there is no manure especially stable manure —as far as nature is concerned and yet nature goes right along keeping those natural fields and forests fertile. How? Where does she obtain the elements so many experts say are only found in stable manure? Those are questions that must be settled in the future—and settled in a common-sense, understandable way that everyone will comprehend. Perhaps the earthworm is the answer. Anyhow, on our 63 acre experimental farm we are doing our best to learn what we can and with our hundreds of readers scattered throughout the country working toward the same end, we really should be able to get somewhere.

★ ★ ★

— Our Modern Methods —

From H. C. Haas
25 West 43rd Street
New York City
January 14, 1943.

It took millions of years to form the earth's topsoil and our machine age, hardly a hundred years old has been quickly destroying a large part of it. We take pride in our civilization, but we do not realize how far and how fast we have gone wrong. In the preparation of foods we have been as stupid as in the care of the topsoil. The people of India are no more stupid.

We Americans have been wasting the earth's treasures shamefully, not thinking that this earth belongs not to this generation alone but to all future generations. Whenever we take anything from it we must be careful to put back equal value. Too many millions of us burn up, or throw into the ocean, or dissipate in other ways, that which does not belong to us alone.

I hate to contemplate a future world in which a large part of its hitherto fertile surface is converted to sandy waste mixed with arsenate of lead, a compound made up of two poisonous elements which will remain poisonous forever, killing all animal life, insect life and bacterial life.

Are you covering Chinese farming methods? I think they have been something like yours. The Chinese throw nothing away. Otherwise they could not support their immense population. Those Orientals have much to teach us —superiority in some ways we can claim, but every race has some claim to recognition, something to teach all the rest. All should be raised to equal level. That is true democracy. With such thoughts we can get the world on our side in this conflict.

(Continued from inside front cover)

In these groves we observed immense deposits of humus that had accumulated over a long period of years. It was especially so along the brooks, where there are "catches" which hold large quantities of vegetable debris and muck brought there by the floods during the heavy rains.

These humus deposits are the gold mines which prompted us to buy the property; not the pine forest as some thought. As a matter of fact, these groves and humus deposits were of absolutely no importance to those who sold the property. And this goes for the natives too. The big American citrus shippers who do a good business in shipping citrus fruit before the Florida crop is ready, since the citrus fruits here reach maturity earlier, are not interested in our humus deposits. They believe in chemical fertilizers, for which they pay exorbitant prices. They like to stimulate their trees for early crops; big crops! They have to buy quantities of insecticides too, and the implements which go with this artificial method of citrus production for the civilized (?) market. But we have seen the tragic result of this new artificial practice. When you stop feeding these groves with chemical fertilizers they rapidly decrease in production and the trees soon die. Such trees, like human beings, who live from the bottles in the drugstores, become "dope fiends", are short-lived.

But we learned a worthwhile lesson somewhere, so we didn't resort to quick-production practice. We had the local blacksmith build us a one-horse dumpcart, which was hauled into the groves to haul out this rich humus. This humus was put into the holes when we planted our trees. It was spread all over the gground. Besides this we used all of our vegetable debris and "cattle-cakes" with the collected grass, leaves and muck soil for our compost piles. We don't waste anything, since we know that from the earth, whence all life comes, all things must return, to give more life, chemically speaking of course.

In our kitchen at the Health Resort there are two large refuse cans. One is painted red, and the other yellow. The red one is for vegetable debris and food scraps, and the yellow one is for the refuse containing seeds. The can with the seeds is emptied at certain places where they will sprout. This gives us perpetual nurseries, where we find our seedlings during the rainy season, when transplanting is done. The other can is emptied around the banana and other plants or in our compost pile. Even waste paper, cardboard, shavings and other debris is used for mulching our pineapples. This has a three-fold purpose, for maintaining humidity around the plants, during the dry season, keeping the weeds down, and enriching the soil when decomposition takes place.

Today, we can shout with pleasant surprise at the sight of earthworms, for we know that our soil is healthy. Furthermore, we know that the pineapples, papayas, citrus fruits and other numerous tropical fruits are nutritious; that our trees will become healthier as the years roll by, since the soil will become more fertile by the constant supply of the rich humus that is being produced all the time as the leaves, weeds, etc., remain to decay and supply the earthworms with materials they need for their life and soil enrichment.

We are proud too to enjoy the distinguished pleasure of having produced the most delicious papayas on the island. And we are unable to supply the demand. But we are planting more, and more; for they will grow anywhere in the neighborhood of our groves, where the earthworms signify a healthful condition of the soil.

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By Sir Albert Howard, C. I. E., M. A.
Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

Sir Albert Howard C. I. E., M. A.

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This is the recognized standard text book for gardeners and farmers who wish to change from the use of ordinary chemical fertilizers to home-made organic fertilizers. Sir Albert Howard has forty years of active experience in the field of organic fertilizers and is the accepted leading authority on the subject. These books are printed in England and owing to war conditions are rather difficult to obtain. We succeeded in securing a limited supply and while they last we are offering them at their regular price.

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